

## AC 27.602 § 27.602 CRITICAL PARTS.

a. Explanation.

(1) Critical parts requirements apply to structural components, rotor drive systems, rotors, and mechanical control systems.

(2) The objective of identifying critical parts is to ensure that critical parts are controlled during design, manufacture, and throughout their service life so that the risk of failure in service is minimized by ensuring that the critical parts maintain the critical characteristics on which certification is based.

(3) Definitions with respect to § 27.602:

(i) The use of the word "could" in paragraph 27.602(a) of the rule means that this failure assessment should consider the effect of flight regime (i.e., forward flight, hover, etc.). The operational environment need not be considered.

(ii) With respect to this rule, the term "catastrophic" means the inability to conduct an autorotation to a safe landing, without exceptional piloting skills, assuming a suitable landing surface is available.

(iii) The use of the word "and" in paragraph 27.602(a) of the rule means the part must have both a catastrophic failure mode together with one or more critical characteristics.

(iv) With respect to this rule, the term "part" means one piece, or two or more pieces permanently joined together.

(v) With respect to this rule, the term "critical characteristic" means any dimension, tolerance, finish, material, or any manufacturing or inspection process, or other feature which cannot tolerate variation from type design requirements and, if nonconforming, would cause failure of the critical part.

(4) Many rotorcraft manufacturers already have procedures in place within their companies for handling "critical parts." These plans may be required by their dealings with other customers, frequently military (e.g., US DoD, UK MoD, Italian MoD). Although these plans may have slightly different definitions of "critical parts" which have sometimes been called "Flight Safety Parts," "Critical Parts," "Vital Parts," or "Identifiable Parts," they have in the past been accepted as meeting the intent of this requirement and providing the expected level of safety. It is acceptable for these plans to use alternative names and terminology provided they meet the intent of this requirement.

b. Procedures. The rotorcraft manufacturer should establish a Critical Parts Plan, which identifies and controls the critical characteristics. The policies and procedures which constitute that plan should be such as to ensure that--

(1) All critical parts of the rotorcraft are identified by means of an appropriate failure assessment and a Critical Parts List is established.

(2) Documentation draws the attention of the personnel involved in the design, manufacture, maintenance, inspection, and overhaul of a critical part to the special nature of the part and details the relevant special instructions. For example all drawings, work sheets, inspection documents, etc., could be prominently annotated with the words "Critical Part" or equivalent and the Instructions for Continued Airworthiness and Overhaul Manuals (if applicable) should clearly identify critical parts and include the needed maintenance and overhaul instructions. The documentation should:

(i) Contain comprehensive instructions for the maintenance, inspection and overhaul of critical parts and emphasize the importance of these special procedures;

(ii) Indicate to operators and overhaulers that unauthorized repairs or modifications to critical parts may have hazardous consequences;

(iii) Emphasize the need for careful handling and protection against damage or corrosion during maintenance, overhaul, storage, and transportation and accurate recording and control of service life (if applicable);

(iv) Require notification of the manufacturer of any unusual wear or deterioration of critical parts and the return of affected parts for investigation when appropriate;

(3) Procedures should be established for identifying and controlling critical characteristics.

(4) To the extent needed for control of critical characteristics, procedures and processes for manufacturing critical parts (including test articles) are defined (for example material source, forging procedures, machining operations and sequence, inspection techniques, and acceptance and rejection criteria). Procedures for changing these manufacturing procedures should also be established.

(5) Any changes to the manufacturing procedures, to the design of a critical part, to the approved operating environment, or to the design loading spectrum are evaluated to establish the effects, if any, on the fatigue evaluation of the part.

(6) Materials review procedures for critical parts (i.e., procedures for determining the disposition of parts having manufacturing errors or material flaws) are in accordance with paragraphs (4) and (5) above.

(7) Critical parts are identified as required, and relevant records relating to the identification are maintained such that it is possible to establish the manufacturing history of the individual parts or batches of parts.

(8) The critical characteristics of critical parts produced in whole or in part by suppliers are maintained.